ployed to transmit the intelligence of an event to a distant place.

It may be true that it is impossible to conceive of a body moving relatively to an observer with velocity greater than that of light. But we can, and do, work with β-particles of radium, and we can imagine two of these expelled in opposite directions from a source of radium at rest relatively to the earth, and therefore, in ordinary parlance, having a velocity relatively to one another nearly twice that of light. This, of course, in no way questions or minimises the importance of the principle of the great German mathematical physicist in its own field, but science is ever sceptical of restrictions which it is told must necessarily and for all time limit its power of disentangling the phenomenon from the appearance of the phenomenon. In any case the author deserves success in thus including in this conscientious review of modern electrical theory some of the modern conceptions which are at once the most foreign to our habits of thought and the most difficult to appreciate at their true worth. Successful the volume undoubtedly is in its purpose of providing serious students acquainted with the older physics an introduction to the newer theories.

(2) This collection of ten lectures by as many authorities treats in simple and clear fashion with some of the special departments of physical science now most to the fore. Brownian movement, the subject of high vacua or ultra-rarefied gases, and the relations between matter and the ether are the only three topics which can claim even thirty years of history. Three more deal with the electron in one or other aspect—electro-magnetic dynamics, the electronic theory of metals, and ionisation by collision and the electric spark—and two with radioactivity, the radiations of the radioactive substances, and their successive transformations. Lastly, two of the newest conceptions, the quantum theory of energy and the magneton theory, complete the volume, which will prove as useful and interesting as earlier publications on similar lines by the Société française de Physique.

(3) The third volume is a collection of some of the most interesting and beautiful discoveries of Prof. R. W. Wood, issued by the Columbia University under the E. K. Adams fund for physical research. They include the notable contributions to resonance spectra and radiations, first with iodine, then from mercury vapour, which have enabled the vapour arising from a cold surface of mercury to be photographed, and going on to experiments with heat waves of more than 0·1 mm. wave-length, analogous to those with Herzian waves, in which a "dew" of condensed mercury globules deposited on quartz was employed for the resonator. This in turn leads to some extraordinary, still incomplete, observations on the electric conductivity of ruled silvered glass gratings, in spite of the complete severance of the silver film by the diamond.

Lastly must be mentioned some attempts to photograph the lunar surface through screens transmitting only yellow, violet, and ultra-violet light respectively. These photographs reveal the presence of a remarkable deposit round the crater of Aristarchus which very probably may be sulphur, and foreshadow a method for carrying out a limited petrological survey of the lunar surface. It is a pity that the volume does not appear to be for sale, for many no doubt would be glad to secure this well-illustrated collection of modern experimental researches by one of its greatest masters.

FREDERICK SODDY.

THE THRESHOLD OF SCIENCE—AND BEYOND.

(1) *Zoology.* By Prof. E. Brucker. Pp. xiii + 219. (London: Constable and Co., Ltd., 1913.) Price 2*s*. net.

(2) *Some Secrets of Nature.* Short Studies in Field and Wood. With an introduction by W. J. P. Burton. Pp. xiv + 144 + plates. (London: Methuen and Co., Ltd., n.d.) Price 1*s*. 6*d*.

(3) *The Romance of Nature.* Studies of the Earth and its Life. With a preface by the Rev. A. Thornley. Pp. xix + 164 + x plates. (London: Methuen and Co., Ltd., n.d.) Price 2*s*.

(4) *In the Lap of the Lammermoors.* By W. McConachie. Pp. xii + 315. (Edinburgh and London: William Blackwood and Sons, 1913.) Price 5*s*. net.

(1) ONE of the many ways of beginning the study of zoology is to take a survey of the whole animal kingdom, working from the simple to the complex, never going very deeply into anything, but using now this, now that, to illustrate a principle That is what Prof. Brucker has done, and it is a feat to have done it so clearly and in such simple language. If the reader, young or old, is able to touch and handle, as well as read about, even a tenth of the creatures discussed, he will have got far across the threshold of the science—to use the phrase which gives its name to this new series. To our thinking there is far too much in the book for an introduction, but that is largely a matter of opinion, and it is doubtless what students say of most courses of elementary instruction which their professors after much thought on the subject decide to deliver. Be this as it may, the author of this little book is evi-

©1913 Nature Publishing Group

dently an experienced teacher, and he has been successful in working out the method he has adopted. His avoidance of the unnecessarily technical is most praiseworthy, even if it leads to difficulties of its own, such as that one, more or less happily circumvented, that the squids are "molluscs with the foot surrounding the head." That is rather a stiff one on the threshold!

(2) A very different kind of introduction is supplied by "Some Secrets of Nature," a book showing real educational insight on the part of the anonymous author. Why should we not know who this is, who sets these quite admirable "problems for consideration," sometimes just a little conundrumoid, at the end of each short study; who reveals a very intimate knowledge of what really goes on in field and wood and some other places too; who knows how to awaken the scientific spirit? As a guide to the embarrassed teacher and an aid to the eager pupil, where rural nature-study (plants and animals) is concerned, we would very strongly recommend this book. We venture to suggest that the note *personnel*—natural in a talk—becomes a little fatiguing in this book. The author is no egotist, but he must have impoverished the printer's stock of one letter.

(3) "The Romance of Nature" is meant to be a "Nature Reader for Senior Scholars," but it is not, in our opinion, very successful. The first chapter discloses what the rest of the book confirms, that the writers are ignorant of the psychology of the normal senior scholar. From the earth's beginnings to the establishment of land and sea; the story of rock and fossil; the life-cycle of a plant and the life-history of a frog; birds and insects; and so on—the general idea and intention of the book is good enough, but the outcome seems to us unattractive. The writers know a great deal; their book is full of useful information; the outlook is wholesome; the inculcation of reverence and independent research is admirable: yet, somehow, this "Nature Reader" does not grip, and we are afraid that it will not lead many senior scholars to appreciate the "Romance of Nature." For one thing, the style is not good enough.

(4) It is not quite fair to bring in Mr. McConachie's book along with the foregoing, for it is a work of art. They are helps across the threshold, but he has got to the hearthstone. Yet there may be justification for what we have had to do. For while the first three books follow different methods, is not their aim one—that of seeing, understanding, enjoying, and learning from what we call Nature? And it is our conviction that unless "Nature Study"—helped or hindered by books—makes for, or at least towards, that cultured outlook which Mr. McConachie's past and present work reveals, then it has in great part missed its mark. The first book reminds us that we must see widely and at the same time precisely; the second book rouses the curious questioning spirit; the third book suggests reverence before the wonderfulness of things; in the fourth book we have the harvest of a clear, searching, well-informed, and loving eye.

Mr. McConachie tells us of his walks in a Border parish, but his gift to us is independent of geography—the suggestion of how much there is in that which lies closest to our feet. Of course, he could not do what he does in these sketches—to be ranked beside those of Richard Jefferies and John Burroughs—unless he knew his birds and flowers and more besides really well, and unless he had a rare gift of style. But beyond that, in these pictures of the Border Parish, the Golden Glen, the Drifting Mist, the Woodpecker's Nest, the Wilderness, the Meadow Burn, the Lonesome Moor, the Summer Shielings, the Southward Flight—to name just a few—there is "a feeling for Nature," which, while in part doubtless the gift of the gods, is also the reward of those who sojourn with nature in sunshine and in storm, and who discipline themselves to hear her voices. And this is the chief end of "Nature-study."

J. ARTHUR THOMSON.

PRACTICAL MATHEMATICS.

(1) *Practical Mathematics: First Year.* By A. E. Young. Pp. vii+124. (London: George Routledge and Sons, Ltd., 1913.) Price 1*s.* 6*d.* net.

(2) *An Elementary Treatise on Calculus.* A Textbook for Colleges and Technical Schools. By W. S. Franklin, B. MacNutt, and R. L. Charles. Pp. ix+253+41. (South Bethlehem, Pa: Lehigh University, 1913.) Price $2.00.

(3) *Problèmes de Mécanique et cours de Cinématique.* By Prof. C. Guichard. Rédaction de MM. Dautry et Deschamps. Pp. 156. (Paris: A. Herman et Fils, 1913.) Price 6 francs.

(4) *Further Problems in the Theory and Design of Structures.* By E. S. Andrews. Pp. viii+236. (London: Chapman and Hall, Ltd., 1913.) Price 7*s.* 6*d.* net.

(1) THE author has covered a wide range of topics within the small compass of a hundred pages. He opens by explaining the use of the vernier calliper and the micrometer screw-gauge, and this leads naturally to an exposition of contracted methods. There is an excellent chapter on graphical work, which includes applications to statics; and there are also sections on the

©1913 Nature Publishing Group